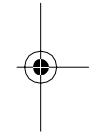Cat. No. 20-508
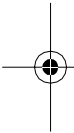
OWNER'S MANUAL
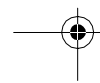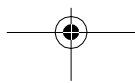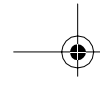
PRO-28
30 Channel
Direct Entry Programmable Scanner

Please read before using this equipment.

Radio Shack

FEATURES

Your new Radio Shack PRO-28 30 Channel Direct Entry Programmable Scanner lets you in on all the action! This scanner gives you direct access to more than 20,000 frequencies that include the police department, fire department, ambulance, amateur radio, and transportation services. You can select up to 30 channels for your scanner to scan and you can change your selection at any time.

The secret to your scanner's ability to scan so many frequencies is its custom-designed microprocessor — a tiny, built-in computer. Your scanner also has these special features:

8-Digit Liquid Crystal Display — shows channel and frequency numbers as well as mode and status indicators.

30 Programmable Channels — let you store frequencies into the scanner's memory.

Band Search — lets you search the frequency bands for active frequencies, and direct the search upward or downward through the bands.

Direct Search — lets you search from the current frequency.

Lockout Function — lets you set your scanner to skip over specified channels while scanning.

Search Skip — lets you select up to 20 frequencies for the scanner to skip during a band or direct search to avoid unwanted frequencies.

Monitor Memory — lets you temporarily store a frequency you locate during a frequency search, which you can then transfer into a channel.
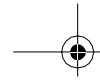
Two-Second Scan Delay — lets you delay scanning for 2 seconds before moving to another channel, so you can hear more replies.

Weather Band Key — scans seven preprogrammed weather frequencies so you can hear about current weather conditions.
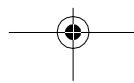
Keylock — prevents you from accidentally changing the scanner's programming.

Memory Backup — keeps the channel frequencies stored in memory for up to 1 hour during a power loss.

Low Battery Alarm — lets you know when the batteries get low.

Three Power Sources — let you power the scanner from internal batteries, a standard AC outlet (using an optional AC adapter), or a vehicle's battery (using an optional DC adapter).

Ni-Cd Battery Charging Circuit — lets you recharge nickel-cadmium batteries while they are inside the battery compartment.

BNC Connector — lets you connect the supplied flexible antenna or an optional outdoor antenna.

Audio Output Jack — lets you connect optional earphones or headphones so you can listen privately, or external speakers so you can listen in a noisy area.
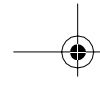
Your scanner can receive all of these bands:

- 29–54 MHz (VHF Low and 6-Meter Ham Band)
- 137–144 MHz (Government)
- 144–148 MHz (2-Meter Ham Band)
- 148–174 MHz (VHF High)
- 406–450 MHz (Ham radio and government)
- 450–470 MHz (UHF Standard)
- 470–512 MHz (UHF "T" Band)

In addition, your scanner is preprogrammed with the following weather service channels:

- 162.400 MHz
- 162.425 MHz
- 162.450 MHz
- 162.475 MHz
- 162.500 MHz
- 162.525 MHz
- 162.550 MHz
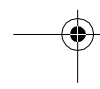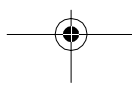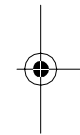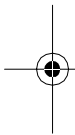
This owner's manual also includes the section "A Guide to the Action Bands," which lets you target services in your area by giving you frequency ranges to search. You can then store any of these frequencies into memory for easy scanning.

For your records, we recommend you record your scanner's serial number in the space provided. The serial number is on the scanner's back panel.

Serial Number _____

FCC NOTICE

Your scanner might cause radio or TV interference even when it is operating properly. To determine whether your scanner is causing the interference, turn off your scanner. If the interference goes away, your scanner is causing it. Try the following methods to eliminate the interference:

- Move your scanner away from the receiver

- Connect your scanner to an outlet that is on a different electrical circuit from the receiver

- Contact your local Radio Shack store for help
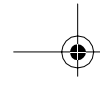
If you cannot eliminate the interference, the FCC requires that you stop using your scanner.

Note: Mobile use of this scanner is unlawful or requires a permit in some areas. Check the laws in your area.

This device complies with Part 15 of *FCC Rules*. Operation is subject to the following conditions:

- This device must not cause harmful interference.

- This device must accept any interference that may cause undesired operation.
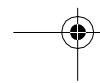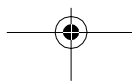
SCANNING LEGALLY

Your scanner covers frequencies used by many different groups including police and fire departments, ambulance services, government agencies, private companies, amateur radio services, military operations, pager services, and wireline (telephone and telegraph) service providers. It is legal to listen to almost every transmission your scanner can receive. However, there are some transmissions you should never intentionally listen to. These include:

- Telephone conversations (either cellular, cordless, or other private means of telephone signal transmission)

- Pager transmissions

- Any scrambled or encrypted transmissions

According to the Electronic Communications Privacy Act (ECPA), you are subject to fines and possible imprisonment for intentionally listening to, using, or divulging the contents of such a transmission unless you have the consent of a party to the conversation (unless such activity is otherwise illegal).

Radio Shack encourages responsible, legal scanner use.

CONTENTS

PREPARATION

POWER SOURCES

You can power your scanner from any of three sources:

- Internal batteries (not supplied)

- Standard AC power (using an optional AC adapter)

- Vehicle battery power (using an optional DC adapter)

USING INTERNAL BATTERIES

You can power your scanner with four AA batteries. For the longest operation and best performance, we recommend alkaline batteries (such as Cat. No. 23-552). Or, you can use rechargeable nickel-cadmium batteries (Cat. No. 23-125).

Warning: The scanner has a built-in circuit that lets you recharge nickel-cadmium batteries inside the battery compartment. However, you must never use this circuit when you have installed non-rechargeable batteries in the scanner. Be sure to read "Important Information about the External Power Jacks" and "Charging Nickel-Cadmium Batteries."

Follow these steps to install or replace batteries.

1. If the scanner is on, turn **VOLUME/OFF** counterclockwise until it clicks to turn it off.

2. Press the tab on the battery compartment cover, and lift off the cover.
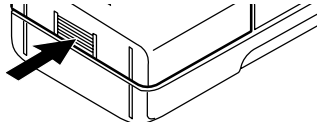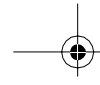
3. Remove any old batteries from the compartment and cover.

   Caution: Always dispose of old non-rechargeable batteries promptly and properly. Do not bury or burn them.

8
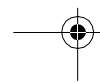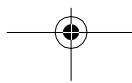
4. Install two batteries in the compartment and two in the cover as indicated by the polarity symbols (+ and –) marked inside.

Cautions:

- Never mix rechargeable and non-rechargeable batteries, or rechargeable batteries of different capacities.

- Use only fresh batteries of the required size and type. Always remove old or weak batteries. Batteries can leak chemicals that destroy electronic circuits.

5. Replace the cover.

If **B** flashes on the display and the scanner beeps every 15 seconds, immediately replace or recharge all four batteries.

IMPORTANT INFORMATION ABOUT THE EXTERNAL POWER JACKS

The scanner has two external power jacks — **POWER** and **CHARGE**. It is important that you understand the purpose of each jack before you connect any adapter to the scanner.

POWER   **CHARGE**
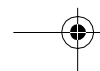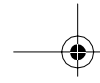
The **POWER** jack powers the scanner and *disconnects* the internal batteries. You can use this jack to connect an external power source (AC adapter or DC power cord) regardless of the type of batteries you install.

The **CHARGE** jack supplies power to operate the scanner and *also charges* the internal batteries. Use the **CHARGE** jack only when you install rechargeable nickel-cadmium batteries.

Warning: Never use the **CHARGE** jack with non-rechargeable batteries. If you try to recharge non-rechargeable batteries, they become very hot and could explode.

USING STANDARD AC POWER

To power the scanner from AC power, you need an AC adapter such as Cat. No. 273-1652 (not supplied).

Warning: Do not use an AC adapter's polarized plug with an extension cord, receptacle, or other outlet unless the blades can be fully inserted to prevent blade exposure.

Cautions:

• You must use an AC adapter that supplies 12 volts and delivers at least 200 milliamps. Its center tip must be set to positive, and its plug must correctly fit the scanner's **POWER** and **CHARGE** jacks. The recommended adapter meets these specifications. Using an adapter that does not meet these specifications could damage the scanner or the adapter.

• Be sure you connect the AC adapter to the scanner before you connect it to a standard AC outlet. Then disconnect the adapter from the AC outlet before you disconnect it from the scanner.

Note: The scanner receives a 12-volt input at the **CHARGE** or **POWER** jack and reduces it to the 6 volts required by the scanner.
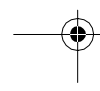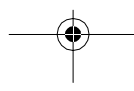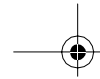
1. Connect the adapter's blue-tipped barrel plug to the adapter's cord and set the barrel plug's tip to positive.

2. Insert the adapter's blue-tipped barrel plug into your scanner's **POWER** jack.
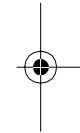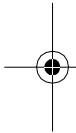
Note: If you installed rechargeable nickel-cadmium batteries in the scanner, remove the plastic cap from the **CHARGE** jack and put the cap in the **POWER** jack. Connect the AC adapter to the **CHARGE** jack. This powers the scanner and recharges the batteries at the same time. See "Charging Nickel-Cadmium Batteries."

3. Plug the adapter's power module into a standard AC outlet.
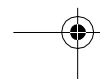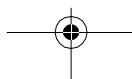
USING VEHICLE BATTERY POWER

You can power the scanner from your vehicle's cigarette lighter socket with an optional DC cigarette lighter power cord (such as Cat. No. 270-1533).

Cautions:

• The recommended DC power cord supplies 12 volts and delivers at least 200 milliamps. Its center tip is set to positive and its plug properly fits the scanner's **POWER** and **CHARGE** jacks. Using a power cord that does not meet these specifications could damage the scanner or the power cord.

• To protect your vehicle's electrical system, always plug the power cord into the scanner before you plug it into your vehicle's cigarette-lighter socket. Always unplug the power cord from the vehicle's cigarette lighter socket before you unplug it from the scanner.

Note: The scanner receives a 12-volt input at the **CHARGE** or **POWER** jack and reduces it to the 6 volts required by the scanner.
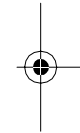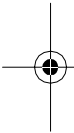
1. Plug the power cord's barrel plug into your scanner's **POWER** jack.

2. Plug the other end of the power cord into your vehicle's cigarette-lighter socket.

   Notes:

   • If you installed rechargeable nickel-cadmium batteries in the scanner, remove the plastic cap from the **CHARGE** jack and put the cap in the **POWER** jack. Connect the DC power cord to the **CHARGE** jack. This powers the scanner and recharges the batteries at the same time. See "Charging Nickel-Cadmium Batteries."
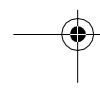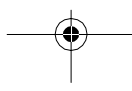
• If the scanner does not operate properly when you use a DC power cord, unplug the power cord from the cigarette lighter socket and clean the socket to remove ashes and debris. If it still does not operate properly, check the fuse in the power cord.

CHARGING NICKEL-CADMIUM BATTERIES

The scanner has a built-in circuit that lets you recharge nickel-cadmium batteries while they are in the scanner. To charge the batteries, remove the plastic cap from the scanner's **CHARGE** jack and put the cap in the **POWER** jack. Then connect an AC adapter or DC power cord to the jack (see "Using Standard AC Power" or "Using Vehicle Battery Power").

Warning: Do not connect either an adapter or power cord to the scanner's **CHARGE** jack if you installed non-rechargeable batteries (standard, extra-life, or alkaline). Non-rechargeable batteries become hot and can even explode if you try to recharge them.

It takes about 10 to 18 hours to recharge batteries that are fully discharged. You can operate the scanner while recharging nickel-cadmium batteries, but the charging time is lengthened.

The first time you use nickel-cadmium batteries, charge them at least 24 hours to bring them to a full charge.

Notes:

• Nickel-cadmium batteries last longer and deliver more power if you occasionally let them fully discharge. To do this, simply use the scanner until it begins beeping every 15 seconds or **B** appears in the display.

• To prevent permanent nickel-cadmium battery power loss, do not charge the batteries at temperatures above about 90°F.

Important: At the end of a rechargeable battery's useful life, it must be recycled or disposed of properly. Contact your local, county, or state hazardous waste management authorities for information on recycling or disposal programs in your area. Some options that might be available are: municipal curb-side collection, drop-off boxes at retailers, recycling collection centers, and mail-back programs.
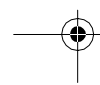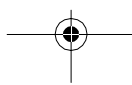
CONNECTING THE ANTENNA

Follow these steps to attach the supplied flexible antenna to the connector on the top of your scanner.
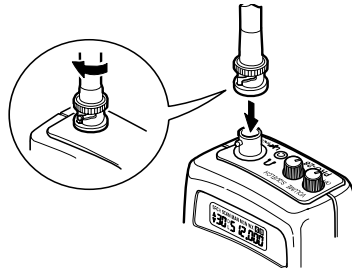
1. Align the slots around the antenna's connector with the tabs on the jack.

2. Press the antenna down over the jack and rotate the antenna's base clockwise until it locks into place.

Connecting an Optional Antenna

The antenna connector on your scanner makes it easy to use the scanner with a variety of antennas. Instead of the supplied antenna, you can attach a different one, such as an external mobile antenna or outdoor base antenna. Your local Radio Shack store sells a variety of antennas.

Always use 50-ohm coaxial cable, such as RG-58 or RG-8, to connect an outdoor antenna. For lengths over 50 feet, use RG-8 low-loss dielectric coaxial cable. If your antenna's cable does not have a BNC connector, you will also need a BNC adapter (available at your local Radio Shack store).

Warning: Use extreme caution when installing or removing an outdoor antenna. If the antenna starts to fall, let it go! It could contact overhead power lines. If the antenna touches a power line, contact with the antenna, mast, cable or guy wires can cause electrocution and death! Call the power company to remove the antenna. Do not attempt to do so yourself.

CONNECTING AN EARPHONE/ HEADPHONES

For private listening, you can plug an earphone or mono headphones (such as Radio Shack Cat. No. 33-175 or 20-210) into the ∩ jack on top of your scanner. This automatically disconnects the internal speaker.
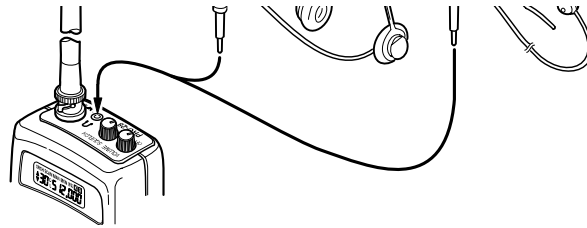
Listening Safely

To protect your hearing, follow these guidelines when you use an earphone or headphones.

• Do not listen at extremely high volume levels. Extended high-volume listening can lead to permanent hearing loss.

• Set the volume to the lowest setting before you begin listening. After you begin listening, adjust the volume to a comfortable level.

• Once you set the volume, do not increase it. Over time, your ears adapt to the volume level, so a volume level that does not cause discomfort might still damage your hearing.

Traffic Safety

Do not wear an earphone or headphones while operating a motor vehicle or riding a bicycle. This can create a traffic hazard and is illegal in some areas.

Even though some earphones and headphones are designed to let you hear some outside sounds when listening at normal volume levels, they still present a traffic hazard.
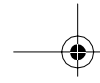
CONNECTING AN EXTENSION SPEAKER

In a noisy area, an extension speaker (such as Radio Shack Cat. No. 21-549) or an amplified speaker (such as Radio Shack Cat. No. 21-541), positioned in the right place, might provide more comfortable listening. Plug the speaker cable's $1/8$-inch mini-plug into your scanner's ∩ jack.
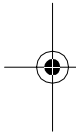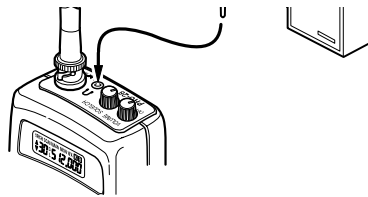
ATTACHING THE BELT CLIP
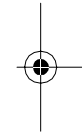
You can attach the supplied belt clip to make your scanner easier to use when you are on the go. Use the supplied screws to attach the belt clip to the scanner. Then slide the belt clip over your belt or waistband.

Belt Clip
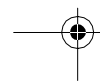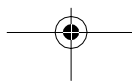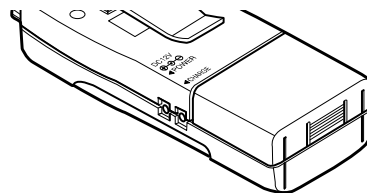
UNDERSTANDING YOUR SCANNER

A LOOK AT THE KEYPAD

Your scanner's keys might seem confusing at first, but this information should help you understand each key's function.
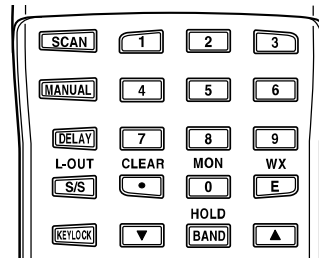
SCAN — scans through the stored channels.

MANUAL — stops scanning and lets you directly enter a channel number or frequency.

DELAY — programs a 2-second delay for the selected channel.

L-OUT/S/S — lets you lock out a selected channel. Skips a specified frequency during band or direct search.

CLEAR/. — erases an incorrect entry or an error. Enters the decimal point in a frequency.

MON/0 — stores frequencies into and accesses the monitor memory. Enters the number 0 for a channel or a frequency.

WX/E — scans through the preprogrammed weather channels. Stores a key entry into memory.

KEYLOCK — locks/unlocks the keypad to prevent accidental program changes.

t and s — enter the down or up search mode direction.

HOLD/BAND — pauses the frequency search. Searches the selected band.

1-**9** — enters the numbers for a channel or a frequency.

17

A LOOK AT THE DISPLAY

The display has several indicators that show the scanner's current operating mode. A quick look at the display will help you understand how to operate your scanner.

SRCH SCAN MAN MON WX K B
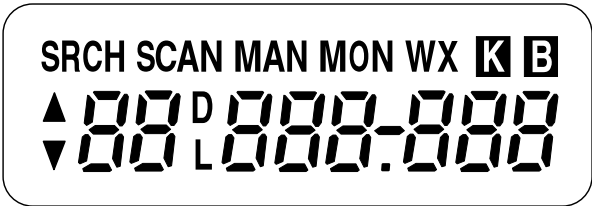
SRCH — appears during a band search (**b** also appears) or a direct search (**d** also appears).

SCAN — appears when you scan channels.

MAN — appears when you manually select a channel.

MON — appears when you listen to a monitor memory.

WX — appears when you scan the preprogrammed weather channels.

K — flashes when you lock the keypad.

B — appears when batteries are low.

D — appears when you program a channel for a two-second delay before scanning or when you listen to a channel programmed with the delay feature.

L — appears when you manually select a locked channel, or during a search hold when the frequency is stored in search skip memory.

t and s — indicates the search or weather scan direction.

Error — appears when you make an entry error.
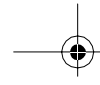
b — appears during a band search.

d — appears during a direct search.

H — appears during a band search hold.

h — appears during a direct search hold.
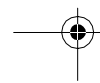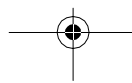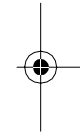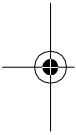
OPERATION

TURNING ON THE SCANNER AND SETTING SQUELCH

1. Turn **SQUELCH** fully clockwise.

2. Turn **VOLUME/OFF** clockwise until it clicks. The scanner automatically scans the 30 channels.

   Note: The first time you turn on the scanner, the channels might not have any frequencies stored in them, but the scanner will continuously scan the empty channels.

3. Press **MANUAL** to stop the scanning. The display shows the current channel.

$$30\ 5\ 12.000$$

4. Turn **VOLUME/OFF** clockwise to set the scanner's volume about half way.

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5. Slowly turn **SQUELCH** counterclockwise until you hear a hissing sound.

6. Adjust **VOLUME/OFF** to a comfortable listening level.

7. Slowly turn **SQUELCH** clockwise until the hissing sound stops.

Note: If you want to listen to a weak or distant station, turn **SQUELCH** counterclockwise to increase receiver sensitivity. If reception is poor, turn **SQUELCH** clockwise to decrease receiver sensitivity.

STORING FREQUENCIES
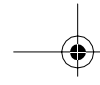
Follow these steps to store frequencies into channels.

1. Press **MANUAL**, enter the channel number where you want to store a frequency, then press **MANUAL** again. The desired channel number appears on the display.

2. Use the number keys and **CLEAR/.** to enter the frequency (including the decimal point) you want to store.
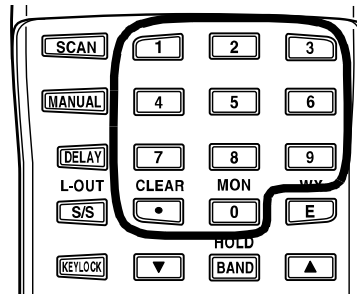
3. Press **WX/E** to store the frequency.

21
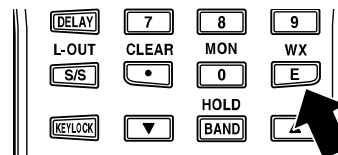
Notes:

- If you make a mistake in Step 2, **Error** appears on the display and the scanner beeps three times. Simply start again from Step 2.

- Your scanner automatically rounds the entered frequency to the nearest valid frequency. For example, if you try to enter a frequency of 151.473, your scanner accepts it as 151.475.

4. Repeat Steps 1-3 to program more channels. Or, if you want to program the next channel in sequence, press **MANUAL** and repeat Steps 2 and 3.

Notes:

- VHF band frequencies (30-300 MHz) are found at .005 MHz steps. UHF band frequencies (300-3000 MHz) are found at .0125 MHz steps.

- Without battery or external adapter power, the scanner protects the frequencies stored in memory for about 60 minutes.
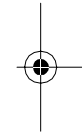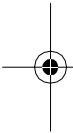
SEARCHING FOR AND STORING ACTIVE FREQUENCIES

Band Search

A band search lets you search for active transmissions within any one of the seven pre-programmed frequency bands.

29–54 MHz	137–144 MHz	144–148 MHz
148–174 MHz	406–450 MHz	450–470 MHz
470–512 MHz		

Follow these steps to search for active frequencies.

1. Press **MANUAL**, then **HOLD/BAND**. The scanner displays the previously selected frequency band for 2 seconds, then automatically starts searching.

2. To select a different frequency band, repeatedly press **HOLD/BAND** until the desired frequency band appears on the display.

22
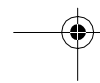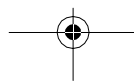
3. To change the search direction, press t to search downward or s to search upward. **b**, **SRCH**, and t or s appear on the display.

4. When the scanner stops on an active frequency, you can do one of the following:

   • To store the displayed frequency into the monitor memory, press **MON/0**. **MON** appears on the display.

   • To continue the search, press t or s.

   • To hold the frequency, press **HOLD/BAND**. **H** appears on the display. To continue the search, press and hold t or s for about 1 second. **H** disappears from the display. The scanner briefly displays the frequency band, then resumes scanning where you stopped.

   Notes:

   • If you want to step through the frequencies while **H** is displayed, press t or s.

   • If you tune to a search skip frequency, **L** appears on the display. See "Search Skip Memory."

   • If you want to change the frequency band, repeatedly press **HOLD/BAND**. The selected frequency band is displayed.

Direct Search

You can search up or down for more frequencies from the currently displayed frequency.

1. Press **MANUAL**.

2. Use the number keys and **CLEAR/.** to enter the frequency (including the decimal point) you want to start the search from, or enter the channel number containing the starting frequency.

3. Press t to search downward or s to search upward from the selected frequency. **d**, **SRCH**, and t or s appear on the display.

4. When the scanner stops on a transmission, you can do one of the following:

   • To store the displayed frequency into the monitor memory, press **MON/0. MON** appears on the display.

   • To continue the search, press t or s.

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- To hold the frequency, press **HOLD/BAND. h** appears on the display. To continue the search, press and hold t or s for about 1 second.

Notes:

- If you want to step through the frequencies while **h** is displayed, press t or s.

- If you tune to a search skip frequency, **L** appears on the display (see "Search Skip Memory").

- If you press **HOLD/BAND**, the scanner restarts as a band search. **b**, **SRCH**, and t or s appear on the display.

Search Skip Memory

You can skip up to 20 specified frequencies during a band or direct search. This lets you avoid unwanted frequencies or ones you have already stored in a channel.
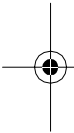
To skip a frequency, press **L-OUT/S/S** when the scanner stops on the frequency during a band or direct search. The scanner stores the frequency in memory and resumes the search.
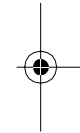
To clear a single frequency from skip memory so the scanner can stop on it during a band or direct search, press **HOLD/BAND** to hold the search, press t or s to select the frequency, then press **L-OUT/S/S** until **L** disappears from the display.

To clear all the skip frequencies at once, while in the search mode, press **HOLD/BAND**, then press and hold **L-OUT/S/S** until the scanner beeps twice (about 3 seconds).

Notes:

- If you program more than 20 frequencies to skip, each new frequency replaces ones you stored earlier, starting from the first stored frequency.

- You can select the skipped frequency when the scanner is in the hold mode. The scanner displays **L** when you select a skipped frequency.

24
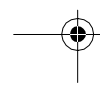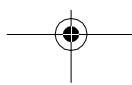
LISTENING TO THE MONITOR MEMORY

The scanner has one monitor memory. You can use this memory to temporarily store a frequency while you decide whether to store it into a channel. This is handy for quickly storing an active frequency when you search through an entire band. Once you have temporarily stored a frequency into the scanner's monitor memory, you can listen to it by pressing **MANUAL** then **MON/0**.
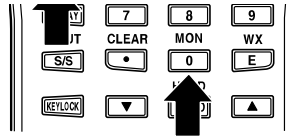
MOVING A FREQUENCY FROM THE MONITOR MEMORY TO A CHANNEL

Follow these steps to move a frequency stored in the monitor memory to a permanent channel.

1. Press **MANUAL**. **MAN** appears on the display.

2. Enter the number for the channel where you want to store the monitor frequency. The channel number appears on the display.

3. Press **MANUAL**. The frequency currently assigned to that channel appears.
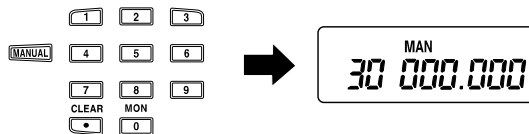
4. Press **MON/0**. The entered frequency appears, and the channel number starts flashing.
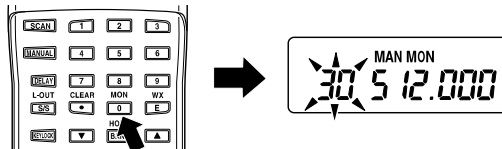
5. Press **WX/E**. The scanner stores the frequency into the selected channel, and the channel number stops flashing.

SCANNING THE STORED CHANNELS

To scan the stored channels, press **SCAN**. Your scanner then scans through all non-locked channels (see "Locking Out Channels").

Using the 2-Second Delay

Many agencies use a two-way radio system that has a period of several seconds between a query and a reply. To avoid missing a reply, you can program a 2-second delay into any channel. When the scanner stops on an active channel with a programmed delay, it continues to monitor the channel for 2 seconds after the activity stops before resuming scanning.

To program a 2-second delay into a specific channel while the scanner is scanning, manually select the desired channel then press **DELAY**. **D** appears on the display.

To program a 2-second delay when the scanner has stopped on an active channel during scanning, quickly press **DELAY** while the channel number is displayed. **D** appears on the display.

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To turn off the 2-second delay on any active channel, press **DELAY** again while the channel number is displayed. **D** disappears from the display.

Locking Out Channels

You can increase the effective scanning speed by locking out individual channels that have a continuous transmission, such as a weather channel. To lock out a channel, manually select the channel and press **L-OUT/S/S** so **L** appears on the display.

Notes:

• You can still manually select locked out channels.

• You cannot lock out all channels.

To remove the lock-out from a channel, manually select the channel and press **L-OUT/S/S** so **L** disappears from the display.

To remove the lock-out from all channels, press **MANUAL**, then press and hold **L-OUT/S/S** until the scanner beeps twice (about 3 seconds).
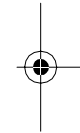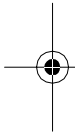
MANUALLY SELECTING A CHANNEL

You can continuously monitor a single channel without scanning. This is useful if you hear an emergency broadcast on a channel and do not want to miss any details — even though there might be periods of silence — or if you want to monitor a specific channel.

Follow these steps to manually select a channel.

1. Press **MANUAL**.

2. Enter the channel number.

3. Press **MANUAL** again.

Or, if your scanner is scanning and stops at the desired channel, press **MANUAL** one time. (Pressing **MANUAL** additional times causes your scanner to step through the channels.)

To resume automatic scanning, press **SCAN**. Your scanner then scans through all non-locked channels.
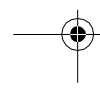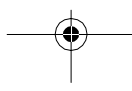
LISTENING TO THE WEATHER BAND

The FCC (Federal Communications Commission) has allocated 11 channels for use by the National Oceanic and Atmospheric Administration (NOAA). We have preprogrammed your scanner with the seven frequencies most commonly used by NOAA (see "National Weather Frequencies").

To hear your local forecast and regional weather information, simply press **WX/E**. Your scanner begins scanning through the weather band, and **WX** appears on the display.

Your scanner should stop within a few seconds, then you hear the local weather broadcast. If the broadcast is weak, you can press **WX/E** again to scan through the rest of the weather band.

USING THE KEYLOCK

Once you program your scanner, you can protect it from accidental program changes by turning on the keylock feature. When locked, the only controls that operate are **SCAN**, **MANUAL**, **KEYLOCK**, **VOLUME/OFF**, and **SQUELCH**.

Note: The keylock does not prevent the scanner from scanning channels.

To turn on the keylock, press and hold **KEYLOCK** until 🄺 flashes on the display. To turn it off, press and hold **KEYLOCK** until 🄺 disappears from the display.
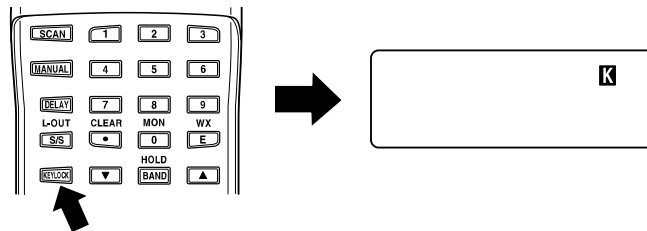
A GENERAL GUIDE TO SCANNING

Reception of the frequencies covered by your scanner is mainly "line-of-sight." That means you usually cannot hear stations that are beyond the horizon.

GUIDE TO FREQUENCIES

National Weather Frequencies

161.650*	161.775*	162.400	162.425
162.440*	162.450	162.475	162.500
162.525	162.550	163.275*	

* Not preprogrammed in this scanner.

Birdie Frequencies

Every scanner has birdie frequencies. Birdies are signals created inside the scanner's receiver. These operating frequencies might interfere with broadcasts on the same frequencies. If you program one of these frequencies, you hear only noise on that frequency. If the interference is not severe, you might be able to turn **SQUELCH** clockwise to cut out the birdie.

The birdie frequencies on this unit to watch for are:

31.2 MHz
41.6 MHz
52.0 MHz
145.6 MHz
156.0 MHZ

To find the birdies in your scanner, begin by disconnecting the antenna and moving it away from the scanner. Make sure that no other nearby radio or TV sets are turned on near the scanner. Use the search function and scan every frequency range from its lowest frequency to the highest. Occasionally, the searching will stop as if it had found a signal, often without any sound. That is a birdie. Make a list of all the birdies in your scanner for future reference.
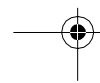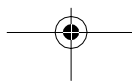
GUIDE TO THE ACTION BANDS

Typical Band Usage

VHF Band (30.00–300.0 MHz)

Low Range	29.00–50.00 MHz
6-Meter Amateur	50.00–54.00 MHz
U.S. Government	137.00–144.00 MHz
2-Meter Amateur	144.00–148.00 MHz
High Range	148.00–174.00 MHz

UHF Band (300.00 MHz–3.0 GHz)

U. S. Government	406.00–420.00 MHz
70-cm Amateur	420.00–450.00 MHz
Low Range	450.00–470.00 MHz
FM-TV Audio Broadcast, Wide Band	470.00–512.00 MHz

Primary Usage

As a general rule, most of the radio activity is concentrated on the following frequencies:

VHF Band

Activities	Frequencies
Government, Police, and Fire	153.785–155.980 MHz
Emergency Services	158.730–159.460 MHz
Railroad	160.000–161.900 MHz

UHF Band

Activities	Frequencies
Land-Mobile "Paired" Frequencies	450.000–470.000 MHz
Base Stations	451.025–454.950 MHz
Mobile Units	456.025–459.950 MHz
Repeater Units	460.025–464.975 MHz
Control Stations	465.025–469.975 MHz

Note: Remote control stations and mobile units operate at 5 MHz higher than their associated base stations and relay repeater units.
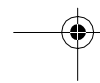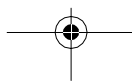
Specified Intervals

Frequencies in different bands are accessible only at specific intervals. For example:

Band Type	Specified Interval
VHF, HAM, and Government	5.0 kHz steps
All Others	12.5 kHz steps

BAND ALLOCATION

To help decide which frequency ranges to scan, use the following listing of the typical services that use the frequencies your scanner receives. These frequencies are subject to change, and might vary from area to area. For a more complete listing, refer to the "Police Call Radio Guide including Fire and Emergency Services," available at your local Radio Shack store.

Abbreviations	Services
BIFC	Boise (ID) Interagency Fire Cache
BUS	Business
CAP	Civil Air Patrol
CB	Citizens Band
CCA	Common Carrier
CSB	Conventional Systems
CTSB	Conventional/Trunked Systems
FIRE	Fire Department
HAM	Amateur (Ham) Radio
GOVT	Federal Government
GMR	General Mobile Radio
GTR	General Trunked
IND	Industrial Services (Manufacturing, Construction, Farming, Forest Products)
MAR	Military Amateur Radio
MARI	Maritime Limited Coast (Coast Guard, Marine telephone, Shipboard Radio, Private stations)
MARS	Military Affiliate Radio System
MED	Emergency/Medical Services
MIL	U.S. Military
MOV	Motion Picture/Video Industry
NEW	New Mobile Narrow
NEWS	Relay Press (Newspaper reporters)
OIL	Oil/Petroleum Industry
POL	Police Department

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PUB. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Public Services
         . . . . . . . . . . . (Public Safety, Local Government, Forestry Conservation)
PSB . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .Public Safety
PTR . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .Private Trunked
ROAD  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Road & Highway Maintenance
RTV . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Radio/TV Remote Broadcast Pickup
TAXI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .Taxi Services
TELB . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Mobile Telephone
        . . . . . . . . . . . . . (Aircraft, Radio Common Carrier, Landline companies)
TELC . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .Cordless Phones
TELM. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Telephone Maintenance
TOW . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Tow Trucks
TRAN. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Transportation Services
       . . . . . . . . . . . . . . . . . . . . . . .(Trucks, Tow Trucks, Buses, Railroad, Other)
TSB . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Trunked Systems
TVn . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . FM-TV Audio Broadcast
USXX. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Government Classified
UTIL. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Power & Water Utilities
WTHR . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Weather
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VERY HIGH FREQUENCY (VHF)—(30 MHz–300 MHz)

VHF Low Band—(29.7–50 MHz—in 5 kHz steps)

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29.900–30.550  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . GOVT, MIL
30.580–31.980 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . IND, PUB
32.000–32.990 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . GOVT, MIL
33.020–33.980 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .BUS, IND, PUB
34.010–34.990 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . GOVT, MIL
35.020–35.980 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . BUS, PUB, IND, TELM
36.000–36.230 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . GOVT, MIL
36.250 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Oil Spill Clean up
36.270–36.990 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . GOVT, MIL
37.020–37.980 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . PUB, IND
38.000–39.000 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . GOVT, MIL
39.020–39.980 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . PUB
40.000–42.000 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .GOVT, MIL, MARI
42.020–42.940 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . POL
42.960–43.180 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . IND
43.220–43.680 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . TELM, IND, PUB
43.700–44.600 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . TRAN
44.620–46.580 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .POL, PUB
46.600–46.990 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .GOVT, TELC
47.020–47.400 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . PUB
47.420 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . American Red Cross
47.440–49.580 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . IND, PUB
49.610–49.990 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . MIL, TELC
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6-Meter Amateur Band—(50–54 MHz)

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50.00–54.00  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . HAM
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U.S. Government Band (137–144 MHz)

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137.000–144.000 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . GOVT, MIL
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2-Meter Amateur Band (144–148 MHz)

```
144.000–148.000 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . HAM
```

VHF High Band (148–174 MHz)

148.050–150.345	CAP, MAR, MIL
150.775–150.790	MED
150.815–150.965	TOW
150.980	Oil Spill Clean up
150.995–151.130	ROAD
151.145–151.475	POL
151.490–151.955	IND, BUS
151.985	TELM
152.0075	MED
152.030–152.240	TELB
152.270–152.465	IND, TAXI
152.480	BUS
152.510–152.840	TELB
152.870–153.020	IND, MOV
153.035–153.725	IND, OIL, UTIL
153.740–154.445	PUB, FIRE
154.490–154.570	IND, BUS
154.585	Oil Spill Clean-Up
154.600–154.625	BUS
154.655–156.240	MED, ROAD, POL, PUB
156.255	OIL
156.275–157.425	MARI
157.450	MED
157.470–157.515	TOW
157.530–157.725	IND, TAXI
157.740	BUS
157.770–158.100	TELB
158.130–158.460	BUS, IND, OIL, TELM, UTIL
158.490–158.700	TELB
158.730–159.465	POL, PUB, ROAD
159.480	OIL
159.495–161.565	TRAN
161.580	OIL
161.600–162.000	MARI, RTV
162.0125–162.35	GOVT, MIL, USXX
162.400–162.550	WTHR
162.5625–162.6375	GOVT, MIL, USXX
162.6625	MED
162.6875–163.225	GOVT, MIL, USXX
163.250	MED
163.275–166.225	GOVT, MIL, USXX
166.250	GOVT, RTV, FIRE
166.275–169.400	GOVT, BIFC
169.445	Wireless Mikes
169.500	GOVT
169.505	Wireless Mikes
169.55–169.9875	GOVT, MIL, USXX
170.000	BIFC
170.025–170.150	GOVT, RTV, FIRE
170.175–170.225	GOVT
170.245–170.305	Wireless Mikes
170.350–170.400	GOVT, MIL
170.425–170.450	BIFC
170.475	PUB
170.4875–173.175	GOVT, PUB, Wireless Mikes
173.225–173.375	MOV, NEWS, UTIL

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```
173.3875–173.5375 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . MIL
173.5625–173.5875 . . . . . . . . . . . . . . . . . . . . . . . . .MIL Medical/Crash Crews
173.60–173.9875 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . GOVT
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ULTRA HIGH FREQUENCY (UHF) (300 MHz–3 GHz)

U. S. Government Band (406–420 MHz)

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406.125–419.975 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . GOVT, USXX
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70-cm Amateur Band (420–450 MHz)

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420.000–450.000 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . HAM
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Low Band (450–470 MHz)

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450.050–450.925 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .RTV
451.025–452.025 . . . . . . . . . . . . . . . . . . . . . . . . . .IND, OIL, TELM, UTIL
452.0375–453.00 . . . . . . . . . . . . . . . . . . . . IND, TAXI, TRAN TOW, NEWS
453.0125–453.9875 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .PUB
454.000 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . OIL
454.025–454.975 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .TELB
455.050–455.925 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .RTV
457.525–457.600 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .BUS
458.025–458.175 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . MED
460.0125–460.6375 . . . . . . . . . . . . . . . . . . . . . . . . . . . .FIRE, POL, PUB
460.650–462.175 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .BUS
462.1875–462.450 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . BUS, IND
462.4625–462.525 . . . . . . . . . . . . . . . . . . . . . . . . . .IND, OIL, TELM, UTIL
462.550–462.725 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . GMR
462.750–462.925 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .BUS
462.9375–463.1875 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . MED
463.200–467.925 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .BUS
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FM-TV Audio Broadcast, UHF Wide Band (470–512 MHz)
(Channels 14 through 69 in 6 MHz steps)

```
475.750 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Channel 14
481.750 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Channel 15
487.750 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Channel 16
     .                                                           .
     .                                                           .
511.750 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Channel 20
```

Note: Some cities use the 470–512 MHz band for land/mobile service.

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AVOIDING IMAGE FREQUENCIES

You might discover one of your regular stations on another frequency that is not listed. It might be what is known as an image frequency. For example, you might find a service that regularly uses a frequency of 453.075 also on 474.675.

To see if it is an image, do a little math.

Note the new frequency.	474.975
Double the intermediate frequency of 10.85 MHz (21.700) and subtract it from the new frequency.	−21.700
If the answer is the regular frequency, then you have tuned to an image.	453.275

Occasionally, you might get interference on a weak or distant channel from a strong broadcast 21.7 MHz below the tuned frequency. This is rare, and the image signal is usually cleared whenever there is a broadcast on the actual frequency.
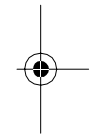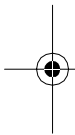
FREQUENCY CONVERSION

The tuning location of a station can be expressed in frequency (kHz or MHz) or in wavelength (meters). The following information can help you make the necessary conversions.

$$1 \text{ MHz (million)} = 1,000 \text{ kHz (thousand)}$$

To convert MHz to kHz, multiply by 1,000:

$$9.62 \text{ MHz} \times 1000 = 9620 \text{ kHz}$$

To convert from kHz to MHz, divide by 1,000:

$$2780 \text{ kHz} \div 1000 = 2.780 \text{ MHz}$$

To convert MHz to meters, divide 300 by the number of megahertz:

$$300 \div 7.1 \text{ MHz} = 42.25 \text{ meters}$$
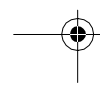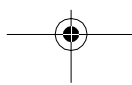
TROUBLESHOOTING

If you have problems, here are some suggestions that might help. If none of these suggestions help, take your scanner to your local Radio Shack store for assistance.

PROBLEM	POSSIBLE CAUSE	REMEDY
Keys do not work or display changes at random.	Undetermined error.	Reset the scanner (see "Resetting the Scanner").
Scanner is on but will not scan.	The **SQUELCH** control is not correctly adjusted.	Adjust **SQUELCH** clockwise.
Scanner is totally inoperative.	No power.	• Check the batteries, or make sure the scanner is plugged into a working AC or DC outlet. • Recharge the rechargeable batteries or replace the non-rechargeable batteries.
	The optional AC or DC power adapter is not connected.	Be sure the adapter is fully inserted into the **DC 12V** jack.
The scanner's display dims or the scanner sounds a tone every 15-30 seconds.	Batteries are not correctly installed.	Make sure the batteries' + and – terminals are properly aligned.
	Batteries need to be replaced.	Insert new batteries or recharge rechargeable batteries.
Poor or no reception.	Environment is not suitable for reception by the scanner. Batteries are weak or dead.	Relocate the scanner and try again.
	Improperly connected antenna.	Be sure the antenna is properly connected.

PROBLEM	POSSIBLE CAUSE	REMEDY
Keypad does not work.	The keylock function is activated.	Press **KEYLOCK** until K dis-appears from the display to turn off the keylock.
B flashes on the dis-play	The batteries are weak.	Recharge the recharge-able batteries, or replace the non-rechargeable bat-teries.
Error appears on the display.	Programming error.	Reprogram the frequency correctly.
In the scan mode, the scanner locks on frequencies that have an unclear transmission.	Programmed frequen-cies are the same as "birdie" frequencies.	Avoid programming fre-quencies listed under "Bird-ie Frequencies" or only listen to them manually.

RESETTING THE SCANNER

If the scanner's display locks up or does not work properly after you con-nect power, you might have to reset the scanner.

Caution: This procedure clears all the information you have pro-grammed into the scanner. Before you reset the scanner, try turning it off and on to see if it begins working properly. Use the following proce-dure only when you are sure your scanner is not working properly.

1. Turn off the scanner.

2. While you press and hold down the **2** and **9** keys, turn on the scan-ner.

CARE AND MAINTENANCE

Your Radio Shack PRO-28 30 Channel Direct Entry Programmable Scanner is an example of superior design and craftsmanship. The following suggestions will help you care for your scanner so you can enjoy it for years.

Keep the scanner dry. If it gets wet, wipe it dry immediately. Liquids might contain minerals that can corrode the electronic circuits.

Use and store the scanner only in normal temperature environments. Temperature extremes can shorten the life of electronic devices(, damage batteries,) and distort or melt plastic parts.

Keep the scanner away from dust and dirt, which can cause premature wear of parts.

Handle the scanner gently and carefully. Dropping it can damage circuit boards and cases and can cause the scanner to work improperly.

Use only fresh batteries of the required size and type. Batteries can leak chemicals that damage your scanner's electronic parts.

Wipe the scanner with a damp cloth occasionally to keep it looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the scanner.

Modifying or tampering with your scanner's internal components can cause a malfunction and might invalidate the scanner's warranty and void your FCC authorization to operate it. If your scanner is not operating as it should, take it to your local Radio Shack store for assistance.

SPECIFICATIONS

Frequency Coverage:

29–54 MHz (in 5 kHz steps)
137–174 MHz (in 5 kHz steps)
406–512 MHz (in 12.5 kHz steps)

Channels of Operation . . . . 30 channels

Sensitivity:
  (FM: 20 dB S/N at 3 kHz deviation):
    29–54 MHz . . . . 0.4 μV
    137–174 MHz . . . . 0.5 μV
    406–512 MHz . . . . 0.6 μV

Selectivity:
    ±10 kHz . . . . –6 db
    ±17 kHz . . . . –50 db

Scan Speed . . . . 15 Channels/Sec.

Search Speed. . . . . 20 Steps/Sec.

Delay Time . . . . 2 Seconds

Acceptable RF Displacement . . . . ±6 kHz

IF Frequencies . . . . 10.85 MHz and 450 kHz

Squelch Sensitivity: Threshold . . . . Less than 0.4 mV

Tight (S+N)/N . . . . 25 dB

Built-in Speaker . . . . 1^9/$_{16}$ inches (4 cm) 8 Ohm, 0.5 W, Dynamic Type

Power Requirement . . . . DC 4 AA Batteries (6.0 VDC), or
4 AA Rechargeable Ni-Cd Batteries (4.8 VDC), or
Vehicle Battery DC Adapter (Cat. No. 270-1533), or
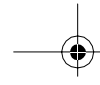AC Adapter (Cat. No. 273-1652)

Current Drain:
    Squelched . . . . 45 mA
    Full Volume Unsquelched . . . . 125 mA

Dimensions (HWD). . . . . 6^3/$_8$ × 2^{11}/$_{16}$ × 1^9/$_{16}$ Inches
(162 × 68.5 × 39 mm)

Weight. . . . . 8.8 oz (250 g)

Specifications are typical; individual units might vary. Specifications are subject to change and improvement without notice.

Limited One-Year Warranty

This product is warranted by Radio Shack against manufacturing defects in material and workmanship under normal use for one (1) year from the date of purchase from Radio Shack company-owned stores and authorized Radio Shack franchisees and dealers. EXCEPT AS PROVIDED HEREIN, RADIO SHACK MAKES NO EXPRESS WARRANTIES AND ANY IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE DURATION OF THE WRITTEN LIMITED WARRANTIES CONTAINED HEREIN. EXCEPT AS PROVIDED HEREIN, RADIO SHACK SHALL HAVE NO LIABILITY OR RESPONSIBILITY TO CUSTOMER OR ANY OTHER PERSON OR ENTITY WITH RESPECT TO ANY LIABILITY, LOSS OR DAMAGE CAUSED DIRECTLY OR INDIRECTLY BY USE OR PERFORMANCE OF THE PRODUCT OR ARISING OUT OF ANY BREACH OF THIS WARRANTY, INCLUDING, BUT NOT LIMITED TO, ANY DAMAGES RESULTING FROM INCONVENIENCE, LOSS OF TIME, DATA, PROPERTY, REVENUE, OR PROFIT OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, EVEN IF RADIO SHACK HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Some states do not allow the limitations on how long an implied warranty lasts or the exclusion of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

In the event of a product defect during the warranty period, take the product and the Radio Shack sales receipt as proof of purchase date to any Radio Shack store. Radio Shack will, at its option, unless otherwise provided by law: (a) correct the defect by product repair without charge for parts and labor; (b) replace the product with one of the same or similar design; or (c) refund the purchase price. All replaced parts and products, and products on which a refund is made, become the property of Radio Shack. New or reconditioned parts and products may be used in the performance of warranty service. Repaired or replaced parts and products are warranted for the remainder of the original warranty period. You will be charged for repair or replacement of the product made after the expiration of the warranty period.

This warranty does not cover: (a) damage or failure caused by or attributable to acts of God, abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation or maintenance, alteration, lightning or other incidence of excess voltage or current; (b) any repairs other than those provided by a Radio Shack Authorized Service Facility; (c) consumables such as fuses or batteries; (d) cosmetic damage; (e) transportation, shipping or insurance costs; or (f) costs of product removal, installation, set-up service adjustment or reinstallation.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Radio Shack Customer Relations, Dept. W, 100 Throckmorton St., Suite 600, Fort Worth, TX 76102

We Service What We Sell   *3/97*
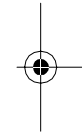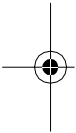
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